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WATER QUALITY MEMORANDUM

Utah Coal Regulatory Program

OK

July 19, 2006

TO: Internal File

THRU: D. Wayne Hedberg, Permit Supervisor

FROM: Dana Dean, P.E., Senior Reclamation Hydrologist

RE: 2005 Third Quarter Water Monitoring, Canyon Fuel Company, LLC, Skyline Mine, C/007/0005-WQ05-3, Task #2330

The Skyline Mine is an operating longwall mine. Current operations are in the North Lease area of the mine. Many mined-out areas of the mine have been sealed-off. Water monitoring requirements can be found in Section 2, especially pages 2-36, 2-36a, 2-36b, 2-37, 2-37a, and 2-39aa of the MRP.

1. Was data submitted for all of the MRP required sites? YES ☒ NO ☐

Springs

The MRP requires summer sampling at 24 springs (S10-1, S12-1, S13-2, S13-7, S14-4, S15-3, S17-2, S22-5, S22-11, S23-4, S24-1, S24-12, S26-13, S34-12, S35-8, S36-12, 2-413, 3-290, WQ1-39, WQ3-6, WQ3-26, WQ3-41, WQ3-43, and WQ4-12).

The Permittee submitted all required samples for the spring sites.

Streams

The MRP requires summer sampling at 43 stream-sites (CS-1, CS-3, CS-4, CS-6, CS-7, CS-8, CS-9, CS-10, CS-11, CS-12, CS-13, CS-14, CS-15, CS-16, CS-17, CS-18, CS-19, CS-20, CS-21, CS-22, CS-23, MD-1, SRD-1, F-9, F-10, UP&L-10, VC-6, VC-9, VC-10, VC-11, VC-12, MC-1, MC-2, MC-3, MC-4, MC-5, MC-6, WRDS-1, WRDS-2, WRDS-3, WRDS-4, EL-1, and EL-2).

The Permittee submitted all required samples for the stream sites.

Wells

The MRP requires summer sampling at 18 wells (JC-1, JC-3, ELD-1, W79-10-1-B, W79-14-2A, W79-26-1, W79-35-1A, W79-35-1B, W2-1, W20-4-1, W20-4-2, W99-4-1, W99-21-1, W99-28-1, W20-28-1, 91-26-1, W91-35-1, and 92-91-03).

The Permittee submitted all required samples for the well sites.

UPDES

The UPDES Permit/MRP require weekly monitoring of 3 outfalls: 001, Sedimentation Pond Discharge to Eccles Creek at the Portal; 002, Sedimentation Pond Discharge to Eccles Creek at the Loadout; and 003, the Sedimentation Discharge at the Waste Rock Disposal Site. Well JC-3 is permitted as a UPDES point, but PacifiCorp is the Permittee, and JC-3 has not discharged since July of 2004.

The Permittee submitted all required samples for the UPDES sites.

2. Were all required parameters reported for each site? YES ☐ NO ☒

The Permittee failed to report several parameters, as listed on the attached sheets. These omissions were included in N06-39-3-1 (April 25, 2006). The Permittee indicated in a letter dated April 26, 2006 that they did not believe they had any of these missing parameters, and therefore would not be able to submit them.

3. Were any irregularities found in the data? YES ☒ NO ☐

Several parameters fell outside of two standard deviations from the mean encountered at the respective sites. They were:

Site	Parameter	Value	Standard Deviations from Mean	Mean
CS-3	Chloride	62 mg/L	2.88	14.61 mg/L
CS-6	Sulfate	333 mg/L	2.05	128.75 mg/L
F-10	Sulfate	18 mg/L	2.17	12.19 mg/L
MC-1	Turbidity	20.6 NTU	2.34	7.90 NTU
MC-2	Turbidity	162 NTU	36.2	6.68 NTU
MC-2	Total Suspended Solids	136 mg/L	5.75	21.57 mg/L
MC-6	Turbidity	17.2 NTU	2.21	7.00 NTU
S14-4	pH	8.31	2.96	6.94
S17-2	Cation/Anion Balance	3.3 %	2.05	1.20 %
WQ3-6	Total Suspended Solids	82 mg/L	3.05	19.00 mg/L
JC-1	Flow	1817 gpm	2.17	3645.03 gpm
ELD-1	Flow	1817 gpm	3.94	3871.56 gpm
W20-4-2	Depth	1104.74 feet	3.15	1145.78 feet
W99-28-1	Depth	968.92 feet	2.00	993.68 feet

The cation/anion balance at S17-2 is below the 5% attention value, and therefore not of concern.

There is a fairly strong upward trend in chloride at CS-3 ($R^2 = 0.627$), with no real correlation to flow. The drinking water criterion for chloride is 250 mg/L. The criteria for protection of aquatic life are 600 mg/L for short-term exposure, and 1200 mg/L for long-term exposure. The levels of chloride recorded at CS-3 are well below any of these levels, and regardless of the origin, they are not of concern at this time.

The water elevation was higher than usual at W20-4-2 and W99-28-1. There is a fairly strong overall upward trend at W20-4-2 (R^2= 0.494, 0.926 since southwest mine workings allowed to flood), and a slight overall upward trend at W99-28-1 (R^2= 0.181, 0.971 since southwest mine workings allowed to flood). The Permittee suggests that it is possibly due to recovery of the Storr's Sandstone after the mine was flooded. Both wells have only been monitored since 2002. The initial level at W20-4-2 was 8420.53 feet, and at W99-28-1 it was 8377.3 feet. This quarter's elevations are 8449.26 feet, and 8382.08 feet, respectively. This is a positive sign for the hydrologic balance in the area.

The lower than usual average flow at JC-1 and ELD-1 is due to the JC-1 pump being shut down for testing from September 14 to September 30.

The pH at S14-4 has a very slight upward trend (R^2= 0.156), with no real correlation to flow. This is the highest reading ever recorded at the site (out of 73 readings), though two samples in 1982 had a pH of 8.2. A pH of 8.31 is still in an acceptable range for natural waters and is not of concern at this time.

There is a weak upward trend in sulfate at CS-6, and a somewhat stronger one at F-10 (R^2= 0.3353, and 0.534). Each has a weak correlation to flow. Though the sulfate reading at CS-6 is rather high, there is no indication of acid mine drainage (AMD), since the pH has remained at or above 7.2, there is alkalinity (234 mg/L), and the levels of iron, manganese and aluminum have remained low. Sulfate is not toxic to plants or animals (even at very high concentration), but has a cathartic effect on humans in concentrations over 500 mg/L. For this reason, the EPA has set the secondary standard as 250 mg/L. The sulfate at CS-6 has been greater than 250 mg/L in just 12% of the samples, mostly since 1991. The sulfate tends to dilute when introduced into Eccles Creek and by the time it gets to CS-6 is about 30% of the value at CS-12, while the alkalinity remains at about 61% of the CS-12 value. The Division will continue to closely monitor the trend of this parameter.

There is only a very weak upward trend in total suspended solids (TSS) at MC-2, and WQ3-6 (R^2= 0.045, and 0.156) with no real correlation to flow. There are no water quality standards for TSS, but the Division will continue to monitor this trend.

There is at most a weak trend in the turbidity readings at MC-1, MC-2, and MC-6, though their values were well above the mean this quarter. Part of the reason may be that there is a small sample size for each site (n=19, 20, 9). There is a weak positive correlation to flow. There is no water quality standard for turbidity, but it closely relates to the amount of solids in the water, particularly TSS. The TSS at each of these sites,

except MC-2 was within acceptable ranges this quarter.

Several routine Reliability Checks were outside of standard values. They were:

Site	Reliability Check	Value Should Be...	Value is...
CS-1	Conductivity/Cations	>90 & < 110	81
CS-1	K/(Na + K)	< 20%	25%
CS-3	Na/(Na + Cl)	> 50%	20%
CS-4	Na/(Na + Cl)	> 50%	48%
CS-6	Mg/(Ca + Mg)	< 40 %	50%
CS-6	Ca/ (Ca + SO4)	> 50 %	43%
CS-9	Cation/Anion Balance	< 5%	5.0%
CS-9	TDS/Conductivity	>0.55 & <0.75	0.55
CS-9	Conductivity/Cations	>90 & < 110	88
CS-11	TDS/Conductivity	>0.55 & <0.75	0.54
CS-11	Na/(Na + Cl)	> 50%	43%
CS-13	Na/(Na + Cl)	> 50%	46%
CS-14	TDS/Conductivity	>0.55 & <0.75	0.78
CS-19	Conductivity/Cations	>90 & < 110	89
CS-20	TDS/Conductivity	>0.55 & <0.75	0.53
CS-21	Conductivity/Cations	>90 & < 110	81
F-10	Conductivity/Cations	>90 & < 110	87
F-10	K/(Na + K)	< 20%	21%
UPL-10	Conductivity/Cations	>90 & < 110	83
UPL-10	Na/(Na + Cl)	> 50%	36%
VC-6	Mg/(Ca + Mg)	< 40 %	48%
VC-6	Ca/ (Ca + SO4)	> 50 %	44%
VC-9	Mg/(Ca + Mg)	< 40 %	49%
VC-9	Ca/ (Ca + SO4)	> 50 %	44%
VC-10	TDS/Conductivity	>0.55 & <0.75	0.52
VC-10	Conductivity/Cations	>90 & < 110	84
VC-10	K/(Na + K)	< 20%	23%
MC-6	TDS/Conductivity	>0.55 & <0.75	0.55
S10-1	Conductivity/Cations	>90 & < 110	86
S10-1	K/(Na + K)	< 20%	44%
S10-1	Na/(Na + Cl)	> 50%	39%
S13-7	Cation/Anion Balance	< 5%	5.9%
S13-7	Conductivity/Cations	>90 & < 110	78
S17-2	Conductivity/Cations	>90 & < 110	84
S17-2	Na/(Na + Cl)	> 50%	50%
S24-1	Mg/(Ca + Mg)	< 40 %	41%
WQ1-39	Conductivity/Cations	>90 & < 110	76
WQ3-26	K/(Na + K)	< 20%	25%
WQ3-41	Conductivity/Cations	>90 & < 110	82

WQ3-41	Na/(Na + Cl)	> 50%	48%
WQ3-43	Conductivity/Cations	>90 & < 110	76
WQ4-12	K/(Na + K)	< 20%	24%
JC-1	TDS/Conductivity	>0.55 & <0.75	0.55
UT0023540-001 7/20	Mg/(Ca + Mg)	< 40 %	46%
UT0023540-001 8/30	TDS/Conductivity	>0.55 & <0.75	0.76
UT0023540-001 8/10	TDS/Conductivity	>0.55 & <0.75	0.79
UT0023540-001 8/3	TDS/Conductivity	>0.55 & <0.75	0.78
UT0023540-001 7/28	TDS/Conductivity	>0.55 & <0.75	0.79
UT0023540-001 7/14	TDS/Conductivity	>0.55 & <0.75	0.76
UT0023540-001 7/6	TDS/Conductivity	>0.55 & <0.75	0.75

These inconsistencies do not necessarily mean that a sample is wrong, but it does indicate that something is unusual. An analysis and explanation of the inconsistencies by the Permittee would help to increase the Division's confidence in the samples. The Permittee should work with the lab to make sure that samples pass all quality checks so that the reliability of the samples does not come into question. The Permittee can learn more about these reliability checks and some of the geological and other factors that could influence them by reading Chapter 4 of *Water Quality Data: Analysis and Interpretation* by Arthur W. Hounslow.

The Utah Division of Water Quality (DWQ) issued the current UPDES permit on Nov. 23, 2004. It allows for a daily maximum of total dissolved solids discharged (TDS) of 1310 mg/l and a 30-day average of 500 mg/l. There is no tons per day (tpd) daily maximum, unless the 30-day average exceeds 500 mg/l; then a 7.1-tpd limit is imposed. The permit also states:

Upon determination by the Executive Secretary that the permittee is not able to meet the 500 mg/L 30-day average or the 7.1 tons per day loading limit, the permittee is required to participate in and/or fund a salinity offset project to include TDS offset credits, within six (6) months of the effective date of this permit.

The Division of Water Quality approved a Salinity Offset Plan for the Skyline Mine on January 5, 2005, which is retroactive to September 2004.

For the third quarter of 2005, the Permittee has not exceeded the daily max of 1310 mg/L for TDS. However, the 20-day average has remained well above 500 mg/l and the tons per day are much greater than 7.1. Because of these exceedences, Canyon Fuel Company continues to participate in the salinity offset program.

4. On what date does the MRP require a five-year re-sampling of baseline water data.

There is no commitment in the MRP to resample for baseline parameters.

5. Based on your review, what further actions, if any, do you recommend?

No further actions are necessary at this time.

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Parameters missing from the Skyline Mine water monitoring data (for third quarter, 2005) as of the end of business on 4/14/06.

See MRP pages 2-36, incorporated Dec. 2, 2005; 2-36a, and 2-36b incorporated August 29, 2005; pages 2-37, and 2-37a incorporated January 6, 2005; and page 2-39-aa incorporated April 24, 2001 for protocols and requirements.

S10-1 dissolved oxygen turbidity	Protocol **A 1,2** **2** requires "water quality field and operational laboratory measurements" Table 2.3.7-2A incorporated Jan. 6, 2005 includes dissolved oxygen and turbidity as field parameters for Aug.-Sep. sampling
S13-7 dissolved oxygen turbidity	Protocol **A 1,2**
WQ1-39 dissolved oxygen turbidity	Protocol **A 1,2**
WQ3-26 dissolved oxygen	Protocol **A 1,2**
WQ3-41 dissolved oxygen turbidity	Protocol **A 1,2**
WQ3-43 dissolved oxygen turbidity	Protocol **A 1,2**
WQ3-6 dissolved oxygen turbidity	Protocol **A 1,2**
WQ4-12 dissolved oxygen	Protocol **A 1,2**
S17-2 dissolved oxygen	Protocol **A 1,2**

S24-1 acidity turbidity dissolved oxygen	Protocol **A 1,2, 13 (13 spring and Fall)** **2** requires "water quality field and operational laboratory measurements" Table 2.3.7-2A incorporated Jan. 6, 2005 includes acidity as a laboratory parameter for Aug.-Sep. sampling
S13-2 dissolved oxygen turbidity	Protocol **A 12** **12** requires "Field parameters only" Table 2.3.7-2A incorporated Jan. 6, 2005 includes turbidity and dissolved oxygen as required field parameters for Aug.-Sep. sampling
S14-4 dissolved oxygen turbidity	Protocol **A 12**
S22-11 dissolved oxygen turbidity	Protocol **A 12**
S22-5 dissolved oxygen turbidity	Protocol **A 12**
S23-4 dissolved oxygen turbidity	Protocol **A 12**
S24-12 dissolved oxygen turbidity	Protocol **A 12**
S26-13 dissolved oxygen turbidity	Protocol **A 12**
S34-12 dissolved oxygen turbidity	Protocol **A 12**
S35-8 dissolved oxygen	Protocol **A 12**

turbidity	
S36-12 dissolved oxygen turbidity	Protocol **A 12**
S15-3 dissolved oxygen turbidity	Protocol **A 12, 13 (13 Spring and Fall)** **12** requires "Field parameters only" Table 2.3.7-2A incorporated Jan. 6, 2005 includes turbidity and dissolved oxygen as required field parameters for Aug.-Sep. sampling